DOCUMENT RESUME

ED 181 488 CS 005 237

AUTHOR	Dunn, Bruce R.; And Others
TITLE	Individual Differences in the Recall of Lower-Level Textual Information. Technical Report No. 150.
INSTITUTION	Bolt, Beranek and Newman, Inc., Cambridge, Mass.; Illinois Univ., Urbana. Center for the Study of Reading.
SPONS AGENCY	National Inst. of Education (DHEW), Washington, D.C.; University of West Florida, Pensacola. Educational Research and Development Center.
PUB DATE	Dec 79
CONTRACT	400-76-0116
NOTE	37p.
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Elementary Education; Grade 4; Grade 6; Individual Differences; Memory; *Reading Ability; *Reading Comprehension; *Reading Processes; Reading Research; *Recall (Psychological); *Retention
IDENTIFIERS	*Center for the Study of Reading IL; *Schemata

ABSTRACT

Two experiments investigated individual differences in semantic recall of expository text. In the first experiment, fourth grade students of superior and average ability read and recalled a prose passage that had been analyzed for its semantic and logical content with a content structure grammar. Unlike past research results, the superior students' mean proportional recall at several subordinate levels of the content structure was equal to their recall at more superordinate levels. The second experiment investigated this phenomenon further with a more heterogeneous population of fourth and sixth grade students with average or below average reading skills. These subjects read and recalled two passages that contained certain semantic relations ("covariance" and "collection" rhetorical predicates) at several subordinate levels of their respective content structures. The results again showed that readers with greater reading skill (the sixth graders) recalled proportionately more information at the selected subordinate levels than the less skilled readers (fourth graders). The data also suggested possible developmental differences in semantic recall, indicating the importance of studying individual differences in prose memory research. (Author/RL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED181448

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

CENTER FOR THE STUDY OF READING

Technical Report No. 150

INDIVIDUAL DIFFERENCES IN THE RECALL OF LOWER-LEVEL TEXTUAL INFORMATION

Bruce R. Dunn
University of West Florida

Samuel R. Mathews II
University of Wisconsin

George Bieger
Cornell University

December 1979

University of Illinois
at Urbana-Champaign
51 Gerty Drive
Champaign, Illinois 61820

Bolt Beranek and Newman Inc.
50 Moulton Street
Cambridge, Massachusetts 02138

This research was funded in part by the Educational Research and Development Center, University of West Florida. In addition, B. Dunn was supported as a visiting scholar at the Center for the Study of Reading, University of Illinois, by the National Institute of Education under Contract No. US-NIE-C-400-76-0116.

CS00237

Abstract

Two experiments are reported which investigated individual differences in semantic recall of expository text. In Experiment 1, superior- and average-ability fourth graders were given a prose passage to read and recall. The passage was analyzed for its semantic and logical content using Meyer's (1975) content structure grammar, and subjects' recall protocols scored using her scoring procedures. In contrast with the results of past research, superior-ability students' mean proportional recall at several subordinate levels of the content structure was equal to their recall at more superordinate levels. Experiment 2 investigated this phenomenon further using a more heterogeneous population consisting for fourth and sixth graders, assessed as having either average or below average reading skill. Subjects read and recalled two passages written specifically to contain certain semantic relations (covariance and collection rhetorical predicates) at several subordinate levels of their respective content structures. Results again showed that those with greater reading skill (sixth graders) recalled proportionally more information at those selected subordinate levels than did the less skilled readers (fourth graders). Further, data are provided which suggest possible developmental differences in semantic recall. These and other findings are used to argue the importance of studying individual differences in prose memory research.

Individual Differences in the Recall of Lower-Level Textual Information

The use of psycholinguistic grammars to provide information about the effects of text variables on the recall of prose by individuals of different ability levels has increased significantly in recent years. The advent of generative grammars (Chomsky, 1965; Fillmore, 1968; among others) has provided considerable flexibility in the analysis of intrasentence characteristics for both syntactic and semantic aspects of sentences. With the development of text-based grammars (e.g., Fredriksen, 1975; Kintsch, 1974; Meyer, 1975; Thorndyke, 1977), information on the effects of other aspects of prose including intersentence relationships has been made available.

Of the text-based grammars attracting the attention of psychologists and educators, Meyer's (1975) analytical system has most consistently differentiated between subjects varying on some ability dimension. Further, Meyer's prose grammar is attractive to the researcher because it meets the following criteria: It was developed primarily for use with expository prose; it adequately describes the implicit and explicit relations between hierarchically related propositions (concepts) in text; it is reasonably parsimonious; and it has been shown to be a powerful predictor of prose recall (see Dunn, in press, for a review).

When Meyer's system is used to analyze text, it produces a single hierarchically arranged tree structure called the content structure. The content structure is composed of the words from the text, specified

case roles (similar to the case grammar of Fillmore, 1968), and a series of terms which explicate the nature of the logical relations between propositions (the rhetorical predicates of Grimes, 1975). All of these elements are termed idea units because all provide some level of semantic description.

The content structure illustrates the pattern of subordination of ideas in a passage. The top-level or superordinate ideas typically have many levels of subordinate ideas related to them which are shown by direct downward paths in the structure. Top-level ideas dominate their subordinate ideas, whereas the lower-level ideas generally describe or give more information about the ideas above them.

Meyer's system not only produces a pattern of subordination among ideas in a passage, but it also describes or labels the relationships among the ideas. She argues that a prose passage can be viewed as a complex proposition that can be subdivided into subpropositions bearing certain relations to one another. (This is analogous to the macro-structure described by van Dijk, 1977).

Meyer describes two types of predicates: lexical predicates and rhetorical predicates. Lexical predicates are content words from text, usually verbs and their adjuncts, which take other words contained in the text as arguments. The relationships between the lexical predicate and its arguments are described by case or role relations similar to those described by Fillmore (1968). Rhetorical predicates consist of a finite number of labels and are often found at the higher levels of the content structure and generally describe the overall organization of the text. They are used

to describe how various subordinate ideas are related. A rhetorical proposition has a rhetorical predicate and, although it could have a single item from text as an argument, it typically takes entire lexical propositions or other rhetorical propositions as its arguments. In other words, rhetorical predicates are usually used to specify the relationship among larger segments of text rather than segments of simple sentences. These larger segments may include entire paragraphs or chapters of text. Lexical predicates, on the other hand, are generally used to relate intrasentence items.

Utilizing this prose structure as a standard, Meyer compared subjects' recall of the prose passage to the content structure of that passage. While the effects of several variables in prose were tested, Meyer's major finding was with regard to the effects of the level of a given idea unit (predicates and their related arguments) on its recall. She found that the height of an idea unit in a content structure was positively related to its recall. Thus the higher the given idea unit in the hierarchy, the greater the probability of its recall. Similar results have been reported by others using other hierarchical systems of text analysis (Kintsch, 1974; Kintsch, Kozminsky, Streby, McKoon, & Keenan, 1975; Meyer, 1977; Meyer & McConkie, 1973; Thorndyke, 1977).

Since Meyer's content structure predicts the relative probability of recall at specific levels of prose averaged across adult subjects, it may be useful in predicting developmental or ability differences in prose recall. Several recent studies from Meyer's laboratory have begun to address this

issue (Meyer, 1977; Meyer, Brandt, & Bluth, Note 1). Meyer (1977, Study 3) gave good, average, and poor readers the same passage to read and tested their comprehension using questions. Half the questions tested information at the higher levels of the passage's content or semantic structure, whereas the remaining half tested information contained in the structure's lower levels. Her results showed that all ability groups answered more high-level questions than questions concerning lower-level or detail information; further, more questions of both types were answered by students possessing greater reading skill.

In a recent study Meyer et al. (Note 1) found evidence for ability differences in the recall of semantic information from prose. In their study it is of interest to note that signalling (the emphasis of specific aspects of a passage's organization) was treated as an independent variable and a free-recall task was used as the primary data source. Ninth graders who were either high-, average-, or low-ability readers were given either a signalled or a nonsignalled version of two passages. Each passage dealt with a different topic. Of primary interest was the effect of the type of rhetorical predicate used to organize the top-level structure of the experimental passages on the encoding and retrieval of those passages by the various reading ability groups.

Several of the more important findings by Meyer et al. were: (a) Most students high in reading ability used the same top-level structure for organizing their recall protocols as that used by the author of the passage

(identified by the content structure), while most students having low comprehension did not; (b) Students employing the strategy of utilizing the higher-order structure of the passage recalled much more information than those who did not, particularly in the case of delayed recall; and, (c) There was some indication that signalling increased the immediate recall of poorer comprehenders who tended not to use the higher-order structure. However, these effects were not maintained with delayed recall.

Although of significant importance, neither of the individual difference studies by Meyer and her colleagues (Meyer, 1977, Study 3; Meyer et al., Note 1) adequately investigated the effects of lower-level semantic relations described by rhetorical predicates on recall. The Meyer et al. (Note 1) study used a free-recall task but it was concerned solely with the effects of the highest-level semantic relations in a given passage as described by Meyer's (1975) system. Further, despite the fact that Meyer's (1977, Study 3) results showed individual differences among reading comprehension groups, they are somewhat disappointing because they do not provide sufficient information for distinguishing between qualitative and quantitative differences in processing. This is indicated by a lack of interaction between students' reading ability and level of information contained in the content structure. Such an interaction, coupled with the results of the Meyer et al. (Note 1) study showing differential recall of higher-order semantic relationships between reading ability groups, would have strongly suggested that students processing different reading skills use different strategies when encoding text.

One major reason why Meyer (1977, Study 3) did not find an interaction between reading ability and semantic-structure level appears to be a function of her restricted data analysis. Even though she analyzed all information at all levels of the content structure, she dichotomized her data by combining correct responses from the highest eight levels and compared them with the combined data from the lowest eight levels using a cued-recall task. Collapsing data into two categories (high and low) may have masked differential recall at specific levels. Additionally, the use of a highly signalled passage and a cued-recall task may have further diluted possible differences in recall patterns.

Therefore, our first study was designed to determine if the pattern of recall at the lower as well as the higher levels of the content structure of a passage was different for children varying in reading ability. This study extended Meyer's research in that interest was focused on differential recall of information contained at all levels, not just the highest and/or lowest levels, of the content structure. The crucial test of this idea would be the occurrence of a significant interaction between reading ability and level in the content structure.

Experiment 1

Method

Subjects. Forty fourth grade students enrolled in a local public school system served as subjects. Twenty of the students were participants in a program for gifted learners and were selected for the program based on

classroom performance, performance at above grade level on a county-wide standardized test, and scoring at two or more standard deviations above the mean on an individual intelligence test (WISC). Twenty other students were identified as performing at grade level in classroom activities and on county-wide standardized tests. There were approximately the same number of boys and girls in each group. Those in the gifted program will be referred to as the high-ability group, while the others will be referred to as the average-ability group.

Materials. A 174-word passage, adapted from a longer one used by Meyer (1975), was rewritten using fourth-grade vocabulary based on the vocabulary list in the Silvaroli Informal Reading Inventory (1973). Further, the passage was written with relatively little emphasis (signalling) of the main points, thereby allowing for a more rigorous test of the levels effect by not making the main points of the passage obvious. The passage was then analyzed according to Meyer (1975) to yield its content structure.

Procedure. The children were tested in groups of five subjects each. All were asked to read the passage twice, very carefully, and then to write as much of the passage down from memory as possible in the order they wished. Subjects were told that a recall task would follow the reading task. Although subjects were tested in groups, each subject was given as much time as she/he needed for reading and recall, but was not allowed to refer to the passage during recall. They were told to use words that they recalled from text or to use their own words and not to worry about spelling.

Using the scoring procedures described by Meyer, the recall protocol of each subject was compared to the content structure of the passage, and those idea units recalled were noted. If an entire proposition from the passage was recalled, the subject received credit for recalling the content words as well as the relationships within that proposition. If two related propositions were recalled, the rhetorical predicates relating those propositions was scored as correctly recalled. Individual idea units recalled were counted as correct, but if not recalled in the context of the content structure, no relations or predicates associated with that idea unit were scored as correct.

Results and Discussion

Because the number of idea units at each level differed from the number of idea units at other levels, it was necessary to equate recall scores across levels. Thus the number of idea units at each level recalled by each subject was converted into a proportion of the total number of idea units at each level of the content structure.

A 2 x 2 x 6 (ability group x sex x level of idea unit in content structure) mixed analysis of variance was conducted on the proportional recall data. The level in the structure was treated as a repeated measure. The mean proportion of idea units recalled for each experimental group is listed in Table 1. The main effect of level of the idea unit in the semantic structure and the important two-way reading ability by semantic structural level interaction were found to be highly significant, $F(1,180) = 12.88$, $p < .005$;

$F(5,180) = 164.13$, $p < .001$, respectively. The levels main effect showed considerable deviation from the typical pattern of decreasing recall at increasing levels of subordination found by other investigators (e.g., Kintsch et al., 1975; Meyer, 1975). That is, the average recall from some of the subordinate levels was greater than at levels which were actually more superordinate (L1 = .22; L2 = .11; L3 = .16; L4 = .19; L5 = .22; L6 = .10).

However, most of this deviation can be accounted for by the significant reading ability by semantic-structure level interaction shown in Table 1.

Insert Table 1 about here

The high-ability group appeared to recall more items at the fifth and sixth levels, which are the lower levels of the content structure, than did the average ability students. This was confirmed by Sheffe's post hoc tests ($p < .01$). On the other hand, the average-ability students tended to recall proportionally more of the higher-level items than lower-level ones, thus replicating the trends found by Meyer (1975) and others (e.g., Kintsch et al., 1975; Thorndyke, 1977). It is noteworthy that all of the items contained at levels five and six of the passage's semantic structure and recalled proportionally more by the high-ability students were found in two sentences which occurred in the middle of the actual passage subjects read: "If we use the coal, oil, and gas we have carefully, we will also have less pollution. Less pollution will save electricity we now use to control and clean up the pollution we have." Further, these lower-level five and six items were

arguments for either higher-order level three or level four covariance rhetorical predicates or other semantic relationships also expressed in these two sentences. A covariance rhetorical predicate is defined by Meyer (1975) "as a relation often referred to as condition, result or purpose, with one argument serving as the Antecedent and the other as the Consequent, or result of the Antecedent" (p. 34).

One possible explanation for these results is that the high-ability students simply had a greater short-term or working memory capacity, and produced lengthier recall protocols. This would, of course, increase the chance occurrence of idea units in their recall, including those at level five and six. This is apparently not the case, as the average- and high-ability groups had approximately the same number of words in their recall protocols (39.5 vs. 40 words, respectively).

Our results also raise the possibility that items which serve as arguments for certain higher-order semantic relations, described by Meyer's rhetorical predicates, may be recalled at a relatively high rate by high-ability students regardless of the level of their occurrence in the content or semantic structure of a passage. These results are in contrast with past research which has typically found that all subjects tend to recall items high in the content structure of a passage more frequently than items at the detail of subordinate levels (Kintsch et al, 1975; Meyer, 1975, 1977; Meyer & McConkie, 1973; Thorndyke, 1977). With the exceptions of Meyer's (1977) Study 3, and Meyer et al. (Note 1), none of these experiments was designed to test individual differences in reading ability; none, including

the two Meyer studies, were concerned with differential recall of specific semantic relations at lower levels in the hierarchy.

As mentioned earlier, a probable reason why our results differed from those obtained by Meyer (1977, Study 3) is that she dichotomized the recall data from the various content structure levels into high and low categories. By ignoring recall from the specific levels, she may have masked any differential recall produced by her various reading ability groups. Further, her use of a highly signalled passage and a cued-recall task may have made it easier for less skilled readers to encode and retrieve many points from the passage, even though they had not adequately comprehended it.

While the results of Experiment 1 suggest that subjects with different ability levels process prose differentially for recall, several aspects of the study prohibit a firm conclusion. First, the passage used, although typical of the material contained in many fourth-grade reading texts, was somewhat vague because of the lack of signalling of important semantic information. Because the high-ability students were in fact a select group, their text-encoding strategies and previous knowledge base (schemata) were probably superior to those of the average-ability person. Thus the greater recall of subordinate information by the high-ability students may have been due to increased processing of the passage (necessitated by its vagueness), and not to a specific differential sensitivity to cause the effect relations in text as described by Meyer's (1975) covariance rhetorical predicates.

A second experiment was conducted to replicate and extend the findings of Experiment 1. Two different passages containing selected rhetorical

predicates as well as increased signalling were constructed. (Although not treated as a variable, the increased signalling, which was approximately equal across passages, made the passages more natural and seemingly less contrived.) One passage was specifically written to contain covariance relationships at the middle levels of its content structure, allowing for the investigation of the differential sensitivity hypothesis stated above. The second contained other frequently occurring rhetorical predicates at its subordinate levels (collections and specifics, defined later) in order to determine if they differentially affect the semantic recall of students varying in reading ability. Further, a more representative sample consisting of both fourth and sixth grade students, at either average or below average reading ability, was selected. Use of these subjects allows a generalization to other rankings of ability difference as well as investigation of differences between age groups.

Experiment 2

Method

Subjects. Ninety-two fourth and sixth grade students were selected from a different school than the one used in Experiment 1. Children having average or below average reading ability served as subjects. Reading ability was determined by both students' California Achievement Test (CAT) reading scores and teacher evaluations. If a discrepancy was found between any student's CAT scores and teacher ratings, that student was not included in the sample for Experiment 2.

Materials. Two expository prose passages differing slightly in length were modified from material contained in two third grade textbooks. The semantic content and structure of each were analyzed using Meyer's (1975) content structure procedure. The shorter passage, called "Greeks and Romans," had 165 words and was found to contain seven levels of subordination in its content structure. It was written specifically to contain a covariance relationship (cause and effect or antecedent and consequent) at its most superordinate level (L1) and other covariance relationships at one of the more subordinate levels (L4). Again, this passage was used to determine if the higher recall of the subordinate semantic information by the high-ability students in Experiment 1 at lower levels in the content structure was in fact due to a differential encoding sensitivity for covariance relationships, or merely attributable to their superior processing of the poorly signalled passage used.

The second passage, "Water Pollution," contained 222 words and described the types of water pollution, their causes, and possible solutions to the problem. The resulting content structure had five levels of subordination and had a type of response rhetorical predicate at its highest level consisting of an equally weighted problem and solution. At levels three and four (more subordinate levels) collection rhetorical predicates were the most frequent, although several specific predicates were present. (It is quite difficult to write a meaningful passage with collections only.) According to Meyer (1975), a collection rhetorical predicate describes a list of

elements in text related in some unspecified manner (e.g., lakes, rivers, ponds) and is basically categorical in nature. A specific rhetorical predicate gives more detailed information about something that was stated earlier in a more general manner (e.g., "polluted water may have disease germs in it;" specific -- "It may contain germs that cause typhoid fever"). This passage was used to determine if good readers are only differentially sensitive to logical relations like cause and effect (described by covariance relations) or encode and recall information represented by frequently occurring rhetorical predicates, like collections and specifics, regardless of their level of subordination.

Passages were arranged in counter-balance order in packets of seven pages each. The first page of each consisted of an information page, with the next two pages containing identical copies of the same passage and the fourth being a blank recall sheet for that passage. The remaining pages (five-seven) consisted of an identical arrangement for the other passage.

Procedure. The procedure was similar to that used in the first experiment with the exception that students were tested during their regularly scheduled reading classes. Subjects were informed prior to the experimental task that they would be tested for recall. After reading the first passage twice at their normal reading rate, students wrote as much of the passage as they could recall in any order they wished on the blank sheet of paper. They were given as much time as required and were told to use words that they recalled from the text or their own words. They were instructed further not to worry about correct spelling. After the

first passage was recalled, students were asked to take a five-minute rest before beginning the second passage and were asked to time themselves using a clock at the front of the room. The same procedure was then followed for the remaining passage.

Results and Discussion

The recall data from each passage were analyzed separately because passages differed in length, types of rhetorical relations each contained, and the number of levels of subordination in their respective content structures. As was done in Experiment 1, the number of idea units recalled by each subject at each level in the content structure was converted into the proportion of the total possible units that could be recalled at that given level.

"Greeks and Romans" passage. The proportional recall data from the Greeks and Romans passage were analyzed using a 2 x 2 x 2 x 6 (sex x grade x reading ability x levels in the content structure) mixed analysis of variance, with the latter being a repeated measure. The main effects of grade, $F(1,84) = 15.12$, $p < .001$; reading ability, $F(1,84) = 22.30$, $p < .001$; and levels in the content structure, $F(6,504) = 16.50$, $p < .001$ were found to be significant. Sixth graders' mean proportional recall was higher than fourth graders' (.26 vs. .13). Average reading ability students' mean proportional recall (.26) was greater than low-ability students' recall (.12). The levels main effect again showed some deviation from the typical pattern of decreasing recall as a function of greater subordination (L1 = .34; L2 = .30; L3 = .12; L4 = .11; L5 = .12; L6 = .18; L7 = .12).

The levels main effect is of little interest because of the significant two-way, grade by levels interaction, $F(6,504) = 2.75$, $p < .02$. The means are shown in Table 2, where it can be seen that generally (with the exception of L6) the fourth grade students' recall shows the typical declining pattern

---

Insert Table 2 about here

---

whereas the sixth graders' recall pattern shows not only high recall of the level one superordinate structure defined by a covariance relationship, but relatively high recall at some of the subordinate levels as well (most notably levels four through seven). Of major interest is the fact that the items contained at these lower levels were arguments for other covariance rhetorical predicates found at level four of the content structure of this passage. This result is quite similar to the post-hoc finding in Experiment 1, showing that high-ability fourth grade readers recalled proportionally more arguments of lower level covariance rhetorical predicates than did their less skilled counterparts. Further, results from both studies suggest that cause and effect relationships expressed by covariance rhetorical predicates and their related arguments are more easily encoded by the more skilled readers.

The only other significant finding was the two-way grade by reading ability interaction, $F(1,84) = 8.77$, $p < .005$. The means shown in Table 3 indicate that sixth grade average reading ability students recall proportionally more items than fourth graders and less skilled sixth grade students.

Insert Table 3 about here

This was confirmed by Sheffe's post-hoc comparisons tested at the .05 level.

Although the above results appear to be reliable when passages contain covariance rhetorical predicates at the lower levels, the proportional recall data from the Water Pollution passage was used to determine if similar findings occur when other rhetorical predicates frequently encountered in prose (i.e., collections and specifics) are placed at lower levels of the content structure of a passage.

"Water Pollution" data. Like the Greek and Roman passage data, a similar four-way analysis of variance performed on the Water Pollution proportional recall data yielded significant main effects of grade and reading ability, $F(1,84) = 24.60$, $p < .001$; $F(1,84) = 27.3$, $p < .001$, respectively; with sixth graders recalling proportionally more items on the average than fourth graders (.15 vs. .08) and average-ability readers producing greater mean proportional recall (.14) than low-ability readers (.09). The levels main effect was also significant, $F(4,336) = 31.74$, $p < .001$ ($L1 = .21$; $L2 = .16$; $L3 = .08$; $L4 = .09$; $L5 = .04$).

The important two-way grade by levels in the content structure interaction was again found to be significant, $F(4,336) = 2.93$, $p < .03$, and followed a pattern similar to that found with the Greeks and Romans data. As can be seen in Table 4, fourth grade children's mean proportional recall tended to produce the typical decreasing pattern as a function of increased subordination whereas the sixth graders' pattern showed less decline. Again

---

Insert Table 4 about here

---

it should be noted that levels three and four of this passage contained a

disproportionate number of relations described in its content structure by collection rhetorical predicates, although some specific predicates occurred as well.

In order to test the hypothesis of differential sensitivity, orthogonal planned comparisons (Ferguson, 1966) were computed between fourth and sixth graders' mean proportional recall at levels three and four (see Table 4 for means). Significant differences favoring the sixth graders were found for level three, $F(1,336) = 8.36$, $p < .005$, and level four, $F(1,336) = 11.69$, $p < .001$.

The results based on both passages suggest that sixth grade readers encode frequently occurring semantic relations (i.e., covariance and collection relations) more readily than less experienced fourth grade readers, even when those relationships occur at relatively lower levels of the semantic structure of a passage. These results are quite similar to the results of the first experiment, showing that highly skilled fourth grade readers recalled significantly more covariance predicates and their related arguments than did less skilled fourth grade students.

General Discussion

The results of the present study question previous evidence suggesting that memory structures for expository text (text-based schemata) can be represented by, or are isomorphic to, the hierarchical content structure of a passage. While the hierachial model was shown to be a rough approximation of one's schema for text, individual differences in reading ability were found to be related to significant deviations from the strict recall

hierarchies reported previously (e.g., Kintsch et al., 1975; Meyer, 1975, 1977; Meyer et al., Note 1). Better-skilled readers (high-ability fourth graders, Experiment 1; sixth grade readers, Experiment 2) recalled proportionally more items from certain subordinate levels than at more superordinate levels of the experimental passages' content structures. In contrast, the recall pattern produced by less-skilled readers (average-ability fourth graders, Experiment 1; fourth grade readers, Experiment 2) followed the previously reported pattern of decreasing recall with increased subordination of information in the content structure. These results underscore the importance of assessing the role of individual difference variables in prose memory research, particularly now that powerful tools like Meyer's (1975) content structure text grammar are available.

What is it about these selected semantic relations occurring at the lower levels which make them more "memorable" for the better skilled reader? Because of their basically implicit nature, it may be that many semantic relationships (described by Meyer's rhetorical predicates) require certain inferential skills which are learned or developed. If this were true, then it could be expected that the recall protocols of better-skilled readers would contain proportionally more rhetorical predicates than those of their less-skilled classmates even at the lower levels of subordination. In order to test this notion, a random sample of 20 fourth grade and 20 sixth grade protocols for each passage used in Experiment 2 was selected. Individual proportions were calculated from the fourth level of subordination contained in the content structures of both passages, since one was specifically

written to contain covariance rhetorical predicates and the other to contain primarily collection predicates at this level. Analysis of the Greeks and Romans data showed sixth graders' mean proportional recall (.26) to be significantly greater than fourth graders' recall (.12), $t(39) = 3.30$, $p < .005$. Less dramatic, but similar results were found with the Water Pollution data where again, on the average, sixth graders recalled proportionally more predicates than fourth graders (.30 vs. .27), $t(39) = 2.89$, $p < .005$.

Given the above, a reasonably strong argument can be made that the higher recall of semantic information at subordinate levels by better-skilled readers is due in part to a differential encoding sensitivity for covariance and collection rhetorical predicates. Only future research will determine if these results occur if other predicates, particularly those occurring less frequently, are utilized.

The question of whether this difference in encoding is primarily a function of developmental factors or learning will also have to await further research. However, the results of the present study give *prima facie* evidence for the importance of developmental factors, if it is assumed that the superior-ability fourth grade (Experiment 1) and the sixth grade readers (Experiment 2) were at approximately the same level of semantic development, not yet reached by the less-skilled fourth grade subjects. At the very least, our results suggest that individual differences (perhaps even developmental differences) exist and that further extension of text grammars like Meyer's into semantic development research is clearly justified.

Reference Note

1. Meyer, B. J. F., Brandt, D. M., & Bluth, G. J. Use of author's textual schema: Key for ninth graders' comprehension. Paper presented at the meeting of the American Educational Research Association, Toronto, Canada, March 1978.

References

Chomsky, N. Aspects of the theory of syntax. Cambridge, Mass.: M.I.T. Press, 1965.

Dunn, B. R. Bimodal processing and memory from text. In V. Rentel & S. Corson (Eds.), Psychophysiologic aspects of reading. London: Pergamon Press, in press.

Ferguson, G. A. Statistical analysis in psychology and education (2nd ed.). New York: McGraw-Hill, 1966.

Fillmore, C. J. The case for case. In E. Bach & R. T. Harms (Eds.), Universals in linguistic theory. New York: Holt, Rinehart and Winston, 1968.

Frederiksen, C. H. Representing logical and semantic structure of knowledge acquired from discourse. Cognitive Psychology, 1975, 7, 371-458.

Grimes, J. E. The thread of discourse. The Hague, Holland: Mouton, 1975.

Kintsch, W. The representation of meaning in memory. Hillsdale, N.J.: Erlbaum, 1974.

Kintsch, W., Kozminsky, E., Streby, W., McKoon, G., & Keenan, J. Comprehension and recall of text as a function of content variables. Journal of Verbal Learning and Verbal Behavior, 1975, 14, 196-214.

Meyer, B. J. F. The organization of prose and its effects on memory. Amsterdam: North-Holland, 1975.

Meyer, B. J. F. The structure of prose: Effects on learning and memory and implications for educational practice. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, N.J.: Erlbaum, 1977.

Meyer, B. J. F., & McConkie, G. W. What is recalled after hearing a passage? Journal of Educational Psychology, 1973, 65, 109-117.

Silvaroli, N. J. Classroom reading inventory (2nd ed.). Dubuque, Iowa: Brown, 1973.

Thorndyke, P. W. Cognitive structures in the comprehension and memory of narrative prose. Cognitive Psychology, 1977, 9, 77-110.

van Dijk, T. A. Semantic macro-structures and knowledge frames in discourse comprehension. In M. A. Just & P. A. Carpenter (Eds.), Cognitive processes in comprehension. Hillsdale, N.J.: Erlbaum, 1977.

Table 1

Mean Proportion of Idea Units Recalled from the "Breeder Reactor" Passage as a Function of Reading Ability and Level in the Content Structure

Reading Ability	Level in Content Structure					
	1	2	3	4	5	6
Average	.26	.11	.18	.17	.13	.04
High	.17	.10	.13	.20	.30	.16

Table 2

Mean Proportion of Idea-Units Recalled from the "Greeks and Romans" Passage as a Function of Grade and Level in the Content Structure

Grade	Level in Content Structure						
	1	2	3	4	5	6	7
Fourth	.25	.24	.15	.05	.06	.11	.05
Sixth	.44	.36	.09	.17	.17	.26	.20

Table 3

Mean Proportional Recall of the "Greek and Romans" Passage as a Function of Grade and Reading Ability

Grade	Reading Ability	
	Low	High
Fourth	.11	.15
Sixth	.13	.35

Table 4

Mean Proportion of Idea Units Recalled from the "Water Pollution" Passage as a Function of Grade and Level in the Content Structure

Grade	Level in Content Structure				
	1	2	3	4	5
Fourth	.15	.13	.05	.04	.04
Sixth	.27	.19	.11	.12	.05

CENTER FOR THE STUDY OF READING

READING EDUCATION REPORTS

No. 1: Durkin, D. ***Comprehension Instruction—Where are You?***, October 1977. (ERIC Document Reproduction Service No. ED 146 566, 14p., PC-$1.82, MF-$.83)

No. 2: Asher, S. R. ***Sex Differences in Reading Achievement***, October 1977. (ERIC Document Reproduction Service No. ED 145 567, 30p., PC-$3.32, MF-$.83)

No. 3: Adams, M. J., Anderson, R. C., & Durkin, D. ***Beginning Reading: Theory and Practice***, November 1977. (ERIC Document Reproduction Service No. ED 151 722, 15p., PC-$1.82, MF-$.83)

No. 4: Jenkins, J. R., & Pany, D. ***Teaching Reading Comprehension in the Middle Grades***, January 1978. (ERIC Document Reproduction Service No. ED 151 756, 36p., PC-$3.32, MF-$.83)

No. 5: Bruce, B. ***What Makes a Good Story?***, June 1978. (ERIC Document Reproduction Service No. ED 158 222, 16p., PC-$1.82, MF-$.83)

No. 6: Anderson, T. H. ***Another Look at the Self-Questioning Study Technique***, September 1978. (ERIC Document Reproduction Service No. ED 163 441, 19p., PC-$1.82, MF-$.83)

No. 7: Pearson, P. D., & Kamil, M. L. ***Basic Processes and Instructional Practices in Teaching Reading***, December 1978. (ERIC Document Reproduction Service No. ED 165 118, 29p., PC-$3.32, MF-$.83)

No. 8: Collins, A., & Haviland, S. E. ***Children's Reading Problems***, June 1979. (ERIC Document Reproduction Service No. ED 172 188, 19p., PC-$1.82, MF-$.83)

No. 9: Schallert, D. L., & Kleiman, G. M. ***Some Reasons Why Teachers are Easier to Understand than Textbooks***, June 1979. (ERIC Document Reproduction Service No. ED 172 189, 17p., PC-$1.82, MF-$.83)

No. 10: Baker, L. ***Do I Understand or Do I not Understand: That is the Question***, July 1979. (ERIC Document Reproduction Service No. ED 174 948, 27p., PC-$3.32, MF-$.83)

No. 11: Anderson, R. C., & Freebody, P. ***Vocabulary Knowledge and Reading***, August 1979.

CENTER FOR THE STUDY OF READING

TECHNICAL REPORTS

No. 1: Halff, H. M. ***Graphical Evaluation of Hierarchical Clustering Schemes,*** October 1975. (ERIC Document Reproduction Service No. ED 134 926, 11p., PC-$1.82, MF-$.83)

No. 2: Spiro, R. J. ***Inferential Reconstruction in Memory for Connected Discourse,*** October 1975. (ERIC Document Reproduction Service No. ED 136 187, 81p., PC-$6.32, MF-$.83)

No. 3: Goetz, E. T. ***Sentences in Lists and in Connected Discourse,*** November 1975. (ERIC Document Reproduction Service No. ED 134 927, 75p., PC-$4.82, MF-$.83)

No. 4: Alessi, S. M., Anderson, T. H., & Biddle, W. B. ***Hardware and Software Considerations in Computer Based Course Management,*** November 1975. (ERIC Document Reproduction Service No. ED 134 928, 21p., PC-$1.82, MF-$.83)

No. 5: Schallert, D. L. ***Improving Memory for Prose: The Relationship between Depth of Processing and Context,*** November 1975. (ERIC Document Reproduction Service No. ED 134 929, 37p., PC-$3.32, MF-$.83)

No. 6: Anderson, R. C., Goetz, E. T., Pichert, J. W., & Halff, H. M. ***Two Faces of the Conceptual Peg Hypothesis,*** January 1976. (ERIC Document Reproduction Service No. ED 134 930, 29p., PC-$3.32, MF-$.83)

No. 7: Ortony, A. ***Names, Descriptions, and Pragmatics,*** February 1976. (ERIC Document Reproduction Service No. ED 134 931, 25p., PC-$1.82, MF-$.83)

No. 8: Mason, J. M. ***Questioning the Notion of Independent Processing Stages in Reading,*** February 1976. (***Journal of Educational Psychology,*** 1977, ***69,*** 288-297)

No. 9: Siegel, M. A. ***Teacher Behaviors and Curriculum Packages: Implications for Research and Teacher Education,*** April 1976. (ERIC Document Reproduction Service No. ED 134 932, 42p., PC-$3.32, MF-$.83)

No. 10: Anderson, R. C., Pichert, J. W., Goetz, E. T., Schallert, D. L., Stevens, K. C., & Trollip, S. R. ***Instantiation of General Terms,*** March 1976. (ERIC Document Reproduction Service No. ED 134 933, 30p., PC-$3.32, MF-$.83)

No. 11: Armbruster, B. B. ***Learning Principles from Prose: A Cognitive Approach Based on Schema Theory,*** July 1976. (ERIC Document Reproduction Service No. ED 134 934, 48p., PC-$3.32, MF-$.83)

No. 12: Anderson, R. C., Reynolds, R. E., Schallert, D. L., & Goetz, E. T. ***Frameworks for Comprehending Discourse,*** July 1976. (ERIC Document Reproduction Service No. ED 134 935, 33p., PC-$3.32, MF-$.83)

No. 13: Rubin, A. D., Bruce, B. C., & Brown, J. S. ***A Process-Oriented Language for Describing Aspects of Reading Comprehension,*** November 1976. (ERIC Document Reproduction Service No. ED 136 188, 41p., PC-$3.32, MF-$.83)

No. 14: Pichert, J. W., & Anderson, R. C. ***Taking Different Perspectives on a Story,*** November 1976. (ERIC Document Reproduction Service No. ED 134 936, 30p., PC-$3.32, MF-$.83)

No. 15: Schwartz, R. M. ***Strategic Processes in Beginning Reading,*** November 1976. (ERIC Document Reproduction Service No. ED 134 937, 19p., PC-$1.82, MF-$.83)

No. 16: Jenkins, J. R., & Pany, D. ***Curriculum Biases in Reading Achievement Tests,*** November 1976. (ERIC Document Reproduction Service No. ED 134 938, 24p., PC-$1.82, MF-$.83)

No. 17: Asher, S. R., Hymel, S., & Wigfield, A. ***Children's Comprehension of High- and Low-Interest Material and a Comparison of Two Cloze Scoring Methods,*** November 1976. (ERIC Document Reproduction Service No. ED 134 939, 32p., PC-$3.32, MF-$.83)

No. 18: Brown, A. L., Smiley, S. S., Day, J. D., Townsend, M. A. R., & Lawton, S. C. ***Intrusion of a Thematic Idea in Children's Comprehension and Retention of Stories,*** December 1976. (ERIC Document Reproduction Service No. ED 136 189, 39p., PC-$3.32, MF-$.83)

No. 19: Kleiman, G. M. ***The Prelinguistic Cognitive Basis of Children's Communicative Intentions,*** February 1977. (ERIC Document Reproduction Service No. ED 134 940, 51p., PC-$4.82, MF-$.83)

No. 20: Kleiman, G. M. ***The Effect of Previous Context on Reading Individual Words,*** February 1977. (ERIC Document Reproduction Service No. ED 134 941, 76p., PC-$6.32, MF-$.83)

No. 21: Kane, J. H., & Anderson, R. C. ***Depth of Processing and Interference Effects in the Learning and Remembering of Sentences,*** February 1977. (ERIC Document Reproduction Service No. ED 134 942, 29p., PC-$3.32, MF-$.83)

No. 22 Brown, A. L., & Campione, J. C. ***Memory Strategies in Learning: Training Children to Study Strategically***, March 1977. (ERIC Document Reproduction Service No. ED 136 234, 54p., PC-$4.82, MF-$.83)

No. 23 Smiley, S. S., Oakley, D. D., Worthen, D., Campione, J. C., & Brown, A. L. ***Recall of Thematically Relevant Material by Adolescent Good and Poor Readers as a Function of Written Versus Oral Presentation***, March 1977. (ERIC Document Reproduction Service No. ED 136 235, 23p., PC-$1.82, MF$.83)

No. 24 Anderson, R. C., Spiro, R. J., & Anderson, M. C. ***Schemata as Scaffolding for the Representation of Information in Connected Discourse***, March 1977. (ERIC Document Reproduction Service No. ED 136 236, 18p., PC-$1.82, MF-$.83)

No. 25 Pany, D., & Jenkins, J. R. ***Learning Word Meanings: A Comparison of Instructional Procedures and Effects on Measures of Reading Comprehension with Learning Disabled Students***, March 1977. (ERIC Document Reproduction Service No. ED 136 237, 34p., PC-$3.32, MF-$.83)

No. 26 Armbruster, B. B., Stevens, R. J., & Rosenshine, B. ***Analyzing Content Coverage and Emphasis: A Study of Three Curricula and Two Tests***, March 1977. (ERIC Document Reproduction Service No. ED 136 238, 22p., PC-$1.82, MF-$.83)

No. 27 Ortony, A., Reynolds, R. E., & Arter, J. A. ***Metaphor: Theoretical and Empirical Research***, March 1977. (ERIC Document Reproduction Service No. ED 137 752, 63p., PC-$4.82, MF-$.83)

No. 28 Ortony, A. ***Remembering and Understanding Jabberwocky and Small-Talk***, March 1977. (ERIC Document Reproduction Service No. ED 137 753, 36p., PC-$3.32, MF-$.83)

No. 29 Schallert, D. L., Kleiman, G. M., & Rubin, A. D. ***Analysis of Differences between Oral and Written Language***, April 1977. (ERIC Document Reproduction Service No. ED 144 038, 33p., PC-$3.32, MF-$.83)

No. 30 Goetz, E. T., & Osborn, J. ***Procedures for Sampling Texts and Tasks in Kindergarten through Eighth Grade***, April 1977. (ERIC Document Reproduction Service No. ED 146 565, 80p., PC-$6.32, MF-$.83)

No. 31 Nash-Webber, B. ***Anaphora: A Cross-Disciplinary Survey***, April 1977. (ERIC Document Reproduction Service No. ED 144 039, 43p., PC-$3.32, MF-$.83)

No. 32 Adams, M. J., & Collins, A. ***A Schema-Theoretic View of Reading Comprehension***, April 1977. (ERIC Document Reproduction Service No. ED 142 971, 49p., PC-$3.32, MF-$.83)

No. 33 Huggins, A. W. F. ***Syntactic Aspects of Reading Comprehension***, April 1977. (ERIC Document Reproduction Service No. ED 142 972, 68p., PC-$4.82, MF-$.83)

No. 34 Bruce, B. C. ***Plans and Social Actions***, April 1977. (ERIC Document Reproduction Service No. ED 149 328, 45p., PC-$3.32, MF-$.83)

No. 35 Rubin, A. D. ***Comprehension Processes in Oral and Written Language***, April 1977. (ERIC Document Reproduction Service No. ED 150 550, 61p., PC-$4.82, MF-$.83)

No. 36 Nash-Webber, B., & Reiter, R. ***Anaphora and Logical Form: On Formal Meaning Representation for Natural Language***, April 1977. (ERIC Document Reproduction Service No. ED 142 973, 42p., PC-$3.32, MF-$.83)

No. 37 Adams, M. J. ***Failures to Comprehend and Levels of Processing in Reading***, April 1977. (ERIC Document Reproduction Service No. ED 145 410, 51p., PC-$4.82, MF-$.83)

No. 38 Woods, W. A. ***Multiple Theory Formation in High-Level Perception***, April 1977. (ERIC Document Reproduction Service No. ED 144 020, 58p., PC-$4.82, MF-$.83)

No. 40 Collins, A., Brown, J. S., & Larkin, K. M. ***Inference in Text Understanding***, December 1977. (ERIC Document Reproduction Service No. ED 150 547, 48p., PC-$3.32, MF-$.83)

No. 41 Anderson, R. C., & Pichert, J. W. ***Recall of Previously Unrecallable Information Following a Shift in Perspective***, April 1977. (ERIC Document Reproduction Service No. ED 142 974, 37p., PC-$3.32, MF-$.83)

No. 42 Mason, J., Osborn, J., & Rosenshine, B. ***A Consideration of Skill Hierarchy Approaches to the Teaching of Reading***, December 1977. (ERIC Document Reproduction Service No. ED 150 549, 176p., PC-$12.32, MF-$.83)

No. 43 Collins, A., Brown, A. L., Morgan, J. L., & Brewer, W. F. ***The Analysis of Reading Tasks and Texts***, April 1977. (ERIC Document Reproduction Service No. ED 145 404, 96p., PC-$6.32, MF-$.83)

No. 44 McClure, E. ***Aspects of Code-Switching in the Discourse of Bilingual Mexican-American Children***, April 1977. (ERIC Document Reproduction Service No. ED 142 975, 38p., PC-$3.32, MF-$.83)

No. 45 Schwartz, R. M. ***Relation of Context Utilization and Orthographic Automaticity in Word Identification***, May 1977. (ERIC Document Reproduction Service No. ED 137 762, 27p., PC-$3.32, MF-$.83)

No. 46: Anderson, R. C., Stevens, K. C., Shifrin, Z., & Osborn, J. ***Instantiation of Word Meanings in Children,*** May 1977. (ERIC Document Reproduction Service No. ED 142 976, 22p., PC-$1.82, MF-$.83)

No. 47: Brown, A. L. ***Knowing When, Where, and How to Remember: A Problem of Metacognition,*** June 1977. (ERIC Document Reproduction Service No. ED 146 562, 152p., PC-$10.82, MF-$.83)

No. 48: Brown, A. L., & DeLoache, J. S. ***Skills, Plans, and Self-Regulation,*** July 1977. (ERIC Document Reproduction Service No. ED 144 040, 66p., PC-$4.82, MF-$.83)

No. 49: Goetz, E. T. ***Inferences in the Comprehension of and Memory for Text,*** July 1977. (ERIC Document Reproduction Service No. ED 150 548, 97p., PC-$6.32, MF-$.83)

No. 50: Anderson, R. C. ***Schema-Directed Processes in Language Comprehension,*** July 1977. (ERIC Document Reproduction Service No. ED 142 977, 33p., PC-$3.32, MF-$.83)

No. 51: Brown, A. L. ***Theories of Memory and the Problems of Development: Activity, Growth, and Knowledge,*** July 1977. (ERIC Document Reproduction Service No. ED 144 041, 59p., PC-$4.82, MF-$.83)

No. 52: Morgan, J. L. ***Two Types of Convention in Indirect Speech Acts,*** July 1977. (ERIC Document Reproduction Service No. ED 145 405, 40p., PC-$3.32, MF-$.83)

No. 53: Brown, A. L., Smiley, S. S., & Lawton, S. C. ***The Effects of Experience on the Selection of Suitable Retrieval Cues for Studying from Prose Passages,*** July 1977. (ERIC Document Reproduction Service No. ED 144 042, 30p., PC-$3.32, MF-$.83)

No. 54: Fleisher, L. S., & Jenkins, J. R. ***Effects of Contextualized and Decontextualized Practice Conditions on Word Recognition,*** July 1977. (ERIC Document Reproduction Service No. ED 144 043, 37p., PC-$3.32, MF-$.83)

No. 55: Jenkins, J. R., & Larson, K. ***Evaluating Error Correction Procedures for Oral Reading,*** June 1978. (ERIC Document Reproduction Service No. ED 158 224, 34p., PC-$3.32, MF-$.83)

No. 56: Anderson, T. H., Standiford, S. N., & Alessi, S. M. ***Computer Assisted Problem Solving in an Introductory Statistics Course,*** August 1977. (ERIC Document Reproduction Service No. ED 146 563, 26p., PC-$3.32, MF-$.83)

No. 57: Barnitz, J. ***Interrelationship of Orthography and Phonological Structure in Learning to Read,*** August 1977. (ERIC Document Reproduction Service No. ED 150 546, 62p., PC-$4.82, MF-$.83)

No. 58: Mason, J. M. ***The Role of Strategy in Reading in the Mentally Retarded,*** September 1977. (ERIC Document Reproduction Service No. ED 145 406, 28p., PC-$3.32, MF-$.83)

No. 59: Mason, J. M. ***Reading Readiness: A Definition and Skills Hierarchy from Preschoolers' Developing Conceptions of Print,*** September 1977. (ERIC Document Reproduction Service No. ED 145 403, 57p., PC-$4.82, MF-$.83)

No. 60: Spiro, R. J., & Esposito, J. J. ***Superficial Processing of Explicit Inferences in Text,*** December 1977. (ERIC Document Reproduction Service No. ED 150 545, 27p., PC-$3.32, MF-$.83)

No. 65: Brewer, W. F. ***Memory for the Pragmatic Implications of Sentences,*** October 1977. (ERIC Document Reproduction Service No. ED 146 564, 27p., PC-$3.32, MF-$.83)

No. 66: Brown, A. L., & Smiley, S. S. ***The Development of Strategies for Study Prose Passages,*** October 1977. (ERIC Document Reproduction Service No. ED 145 371, 59p., PC-$4.82, MF-$.83)

No. 68: Stein, N. L., & Nezworski, T. ***The Effects of Organization and Instructional Set on Story Memory,*** January 1978. (ERIC Document Reproduction Service No. ED 149 327, 41p., PC-$3.32, MF-$.83)

No. 69: Stein, N. L. ***How Children Understand Stories: A Developmental Analysis,*** March 1978. (ERIC Document Reproduction Service No. ED 153 205, 68p., PC-$4.82, MF-$.83)

No. 76: Thieman, T. J., & Brown, A. L. ***The Effects of Semantic and Formal Similarity on Recognition Memory for Sentences in Children,*** November 1977. (ERIC Document Reproduction Service No. ED 150 551, 26p., PC-$3.32, MF-$.83)

No. 77: Nash-Webber, B. L. ***Inferences in an Approach to Discourse Anaphora,*** January 1978. (ERIC Document Reproduction Service No. ED 150 552, 30p., PC-$3.32, MF-$.83)

No. 78: Gentner, D. ***On Relational Meaning: The Acquisition of Verb Meaning,*** December 1977. (ERIC Document Reproduction Service No. ED 149 325, 46p., PC-$3.32, MF-$.83)

No. 79: Royer, J. M. ***Theories of Learning Transfer,*** January 1978. (ERIC Document Reproduction Service No. ED 149 326, 55p., PC-$4.82, MF-$.83)

No. 80: Arter, J. A., & Jenkins, J. R. ***Differential Diagnosis-Prescriptive Teaching: A Critical Appraisal,*** January 1978. (ERIC Document Reproduction Service No. ED 150 578, 104p., PC-$7.82, MF-$.83)

No. 81: Shoben, E. J. ***Choosing a Model of Sentence Picture Comparisons: A Reply to Catlin and Jones,*** February 1978. (ERIC Document Reproduction Service No. ED 150 577, 30p., PC-$3.32, MF-$.83)

No. 82 Steffensen, M. S. ***Bereiter and Engelmann Reconsidered: The Evidence from Children Acquiring Black English Vernacular***, March 1978. (ERIC Document Reproduction Service No. ED 153 204, 31p., PC-$3.32, MF-$.83)

No. 83 Reynolds, R. E., Standiford, S. N., & Anderson, R. C. ***Distribution of Reading Time When Questions are Asked about a Restricted Category of Text Information***, April 1978. (ERIC Document Reproduction Service No. ED 153 206, 34p., PC-$3.32, MF-$.83)

No. 84 Baker, L. ***Processing Temporal Relationships in Simple Stories: Effects of Input Sequence***, April 1978. (ERIC Document Reproduction Service No. ED 157 016, 54p., PC-$4.82, MF-$.83)

No. 85 Mason, J. M., Knisely, E., & Kendall, J. ***Effects of Polysemous Words on Sentence Comprehension***, May 1978. (ERIC Document Reproduction Service No. ED 157 015, 34p., PC-$3.32, MF-$.83)

No. 86 Anderson, T. H., Wardrop, J. L., Hively, W., Muller, K. E., Anderson, R. I., Hastings, C. N., & Fredericksen, J. ***Development and Trial of a Model for Developing Domain Referenced Tests of Reading Comprehension***, May 1978. (ERIC Document Reproduction Service No. ED 157 036, 69p., PC-$4.82, MF-$.83)

No. 87 Andre, M. E. D. A., & Anderson, T. H. ***The Development and Evaluation of a Self-Questioning Study Technique***, June 1978. (ERIC Document Reproduction Service No. ED 157 037, 37p., PC-$3.32, MF-$.83)

No. 88 Bruce, B. C., & Newman, D. ***Interacting Plans***, June 1978. (ERIC Document Reproduction Service No. ED 157 038, 100p., PC-$6.32, MF-$.83)

No. 89 Bruce, B. C., Collins, A., Rubin, A. D., & Gentner, D. ***A Cognitive Science Approach to Writing***, June 1978. (ERIC Document Reproduction Service No. ED 157 039, 57p., PC-$4.82, MF-$.83)

No. 90 Asher, S. R. ***Referential Communication***, June 1978. (ERIC Document Reproduction Service No. ED 159 597, 71p., PC-$4.82, MF-$.83)

No. 91 Royer, J. M., & Cunningham, D. J. ***On the Theory and Measurement of Reading Comprehension***, June 1978. (ERIC Document Reproduction Service No. ED 157 040, 63p., PC-$4.82, MF-$.83)

No. 92 Mason, J. M., Kendall, J. R. ***Facilitating Reading Comprehension Through Text Structure Manipulation***, June 1978. (ERIC Document Reproduction Service No. ED 157 041, 36p., PC-$3.32, MF-$.83)

No. 93 Ortony, A., Schallert, D. L., Reynolds, R. E., & Antos, S. J. ***Interpreting Metaphors and Idioms: Some Effects of Context on Comprehension***, July 1978. (ERIC Document Reproduction Service No. ED 157 042, 41p., PC-$3.32, MF-$.83)

No. 94 Brown, A. L., Campione, J. C., & Barclay, C. R. ***Training Self-Checking Routines for Estimating Test Readiness: Generalization from List Learning to Prose Recall***, July 1978. (ERIC Document Reproduction Service No. ED 158 226, 41p., PC-$3.32, MF-$.83)

No. 95 Reichman, R. ***Conversational Coherency***, July 1978. (ERIC Document Reproduction Service No. ED 159 658, 86p., PC-$6.32, MF-$.83)

No. 96 Wigfield, A., & Asher, S. R. ***Age Differences in Children's Referential Communication Performance: An Investigation of Task Effects***, July 1978. (ERIC Document Reproduction Service No. ED 159 659, 31p., PC-$3.32, MF-$.83)

No. 97 Steffensen, M. S., Jogdeo, C., & Anderson, R. C. ***A Cross-Cultural Perspective on Reading Comprehension***, July 1978. (ERIC Document Reproduction Service No. ED 159 660, 41p., PC-$3.32, MF-$.83)

No. 98 Green, G. M. ***Discourse Functions of Inversion Construction***, July 1978. (ERIC Document Reproduction Service No. ED 160 998, 42p., PC-$3.32, MF-$.83)

No. 99 Asher, S. R. ***Influence of Topic Interest on Black Children and White Children's Reading Comprehension***, July 1978. (ERIC Document Reproduction Service No. ED 159 661, 35p., PC-$3.32, MF-$.83)

No. 100 Jenkins, J. R., Pany, D., & Schreck, J. ***Vocabulary and Reading Comprehension: Instructional Effects***, August 1978. (ERIC Document Reproduction Service No. ED 160 999, 50p., PC-$3.32, MF-$.83)

No. 101 Shoben, E. J., Rips, L. J., & Smith, E. E. ***Issues in Semantic Memory: A Response to Glass and Holyoak***, August 1978. (ERIC Document Reproduction Service No. ED 159 662, 85p., PC-$6.32, MF-$.83)

No. 102 Baker, L., & Stein, N. L. ***The Development of Prose Comprehension Skills***, September 1978. (ERIC Document Reproduction Service No. ED 159 663, 69p., PC-$4.82, MF-$.83)

No. 103 Fleisher, L. S., Jenkins, J. R., & Pany, D. ***Effects on Poor Readers' Comprehension of Training in Rapid Decoding***, September 1978. (ERIC Document Reproduction Service No. ED 159 664, 39p., PC-$3.32, MF-$.83)

No. 104 Anderson, T. H. ***Study Skills and Learning Strategies,*** September 1978. (ERIC Document Reproduction Service No. ED 161 000, 41p., PC-$3.32, MF-$.83)

No. 105 Ortony, A. ***Beyond Literal Similarity,*** October 1978. (ERIC Document Reproduction Service No. ED 166 635, 58p., PC-$4.82, MF-$.83)

No. 106 Durkin, D. ***What Classroom Observations Reveal about Reading Comprehension Instruction,*** October 1978. (ERIC Document Reproduction Service No. ED 162 259, 94p., PC-$6.32, MF-$.83)

No. 107 Adams, M. J. ***Models of Word Recognition,*** October 1978. (ERIC Document Reproduction Service No. ED 163 431, 93p., PC-$6.32, MF-$.83)

No. 108 Reder, L. M. ***Comprehension and Retention of Prose: A Literature Review,*** November 1978. (ERIC Document Reproduction Service No. ED 165 114, 116p., PC-$7.82, MF-$.83)

No. 109 Wardrop, J. L., Anderson, T. H., Hively, W., Anderson, R. I., Hastings, C. N., & Muller, K. E. ***A Framework for Analyzing Reading Test Characteristics,*** December 1978. (ERIC Document Reproduction Service No. ED 165 117, 65p., PC-$4.82, MF-$.83)

No. 110 Tirre, W. C., Manelis, L., & Leicht, K. L. ***The Effects of Imaginal and Verbal Strategies on Prose Comprehension in Adults,*** December 1978. (ERIC Document Reproduction Service No. ED 165 116, 27p., PC-$3.32, MF-$.83)

No. 111 Spiro, R. J., & Tirre, W. C. ***Individual Differences in Schema Utilization During Discourse Processing,*** January 1979. (ERIC Document Reproduction Service No. ED 166 651, 29p., PC-$3.32, MF-$.83)

No. 112 Ortony, A. ***Some Psycholinguistic Aspects of Metaphor,*** January 1979. (ERIC Document Reproduction Service No. ED 165 115, 38p., PC-$3.32, MF-$.83)

No. 113 Antos, S. J. ***Processing Facilitation in a Lexical Decision Task,*** January 1979. (ERIC Document Reproduction Service No. ED 165 129, 84p., PC-$6.32, MF-$.83)

No. 114 Gentner D. ***Semantic Integration at the Level of Verb Meaning,*** February 1979. (ERIC Document Reproduction Service No. ED 165 130, 39p., PC-$3.32, MF-$.83)

No. 115 Gearhart, M., & Hall, W. S. ***Internal State Words: Cultural and Situational Variation in Vocabulary Usage,*** February 1979. (ERIC Document Reproduction Service No. ED 165 131, 66p., PC-$4.82, MF-$.83)

No. 116 Pearson, P. D., Hansen, J., & Gordon, C. ***The Effect of Background Knowledge on Young Children's Comprehension of Explicit and Implicit Information,*** March 1979. (ERIC Document Reproduction Service No. ED 169 521, 26p., PC-$3.32, MF-$.83)

No. 117 Barnitz, J. G. ***Reading Comprehension of Pronoun-Referent Structures by Children in Grades Two, Four, and Six,*** March 1979. (ERIC Document Reproduction Service No. ED 170 731, 51p., PC-$4.82, MF-$.83)

No. 118 Nicholson, T., Pearson, P. D., & Dykstra, R. ***Effects of Embedded Anomalies and Oral Reading Errors on Children's Understanding of Stories,*** March 1979. (ERIC Document Reproduction Service No. ED 169 524, 43p., PC-$3.32, MF-$.83)

No. 119 Anderson, R. C., Pichert, J. W., & Shirey, L. L. ***Effects of the Reader's Schema at Different Points in Time,*** April 1979. (ERIC Document Reproduction Service No. ED 169 523, 36p., PC-$3.32, MF-$.83)

No. 120 Canney, G., & Winograd, P. ***Schemata for Reading and Reading Comprehension Performance,*** April 1979. (ERIC Document Reproduction Service No. ED 169 520, 99p., PC-$6.32, MF-$.83)

No. 121 Hall, W. S., & Guthrie, L. F. ***On the Dialect Question and Reading,*** May 1979. (ERIC Document Reproduction Service No. ED 169 522, 32p., PC-$3.32, MF-$.83)

No. 122 McClure, E., Mason, J., & Barnitz, J. ***Story Structure and Age Effects on Children's Ability to Sequence Stories,*** May 1979. (ERIC Document Reproduction Service No. ED 170 732, 75p., PC-$4.82, MF-$.83)

No. 123 Kleiman, G. M., Winograd, P. N., & Humphrey, M. M. ***Prosody and Children's Parsing of Sentences,*** May 1979. (ERIC Document Reproduction Service No. ED 170 733, 28p., PC-$3.32, MF-$.83)

No. 124 Spiro, R. J. ***Etiology of Reading Comprehension Style,*** May 1979. (ERIC Document Reproduction Service No. ED 170 734, 21p., PC-$1.82, MF-$.83)

No. 125 Hall, W. S., & Tirre, W. C. ***The Communicative Environment of Young Children: Social Class, Ethnic, and Situational Differences,*** May 1979. (ERIC Document Reproduction Service No. ED 170 788, 30p., PC-$3.32, MF-$.83)

No. 126 Mason, J., & McCormick, C. ***Testing the Development of Reading and Linguistic Awareness,*** May 1979. (ERIC Document Reproduction Service No. ED 170 735, 50p., PC-$3.32, MF-$.83)

No. 127 Brown, A. L., & Campione, J. C. ***Permissible Inferences from the Outcome of Training Studies in Cognitive Development Research,*** May 1979. (ERIC Document Reproduction Service No. ED 170 736, 34p., PC-$3.32, MF-$.83)

No. 128 Brown, A. L., & French, L. A. ***The Zone of Potential Development: Implications for Intelligence Testing in the Year 2000,*** May 1979. (ERIC Document Reproduction Service No. ED 170 737, 46p., PC-$3.32, MF-$.83)

No. 129 Nezworski, T., Stein, N. L., & Trabasso, T. ***Story Structure Versus Content Effects on Children's Recall and Evaluative Inferences,*** June 1979. (ERIC Document Reproduction Service No. ED 172 187, 49p., PC-$3.32, MF-$.83)

No. 130 Bruce, B. ***Analysis of Interacting Plans as a Guide to the Understanding of Story Structure,*** June 1979. (ERIC Document Reproduction Service No. ED 174 951, 43p., PC-$3.32, MF-$.83)

No. 131 Pearson, P. D., Raphael, T., TePaske, N., & Hyser, C. ***The Function of Metaphor in Children's Recall of Expository Passages,*** July 1979. (ERIC Document Reproduction Service No. ED 174 950, 41p., PC-$3.32, MF-$.83)

No. 132 Green, G. M. ***Organization, Goals, and Comprehensibility in Narratives: Newswriting, a Case Study,*** July 1979. (ERIC Document Reproduction Service No. ED 174 949, 66p., PC-$4.82, MF-$.83)

No. 133 Kleiman, G. M. ***The Scope of Facilitation of Word Recognition from Single Word and Sentence Frame Contexts,*** July 1979. (ERIC Document Reproduction Service No. ED 174 947, 61p., PC-$4.82, MF-$.83)

No. 134 McConkie, G. W., Hogaboam, T. W., Wolverton, G. S., Zola, D., & Lucas, P. A. ***Toward the Use of Eye Movements in the Study of Language Processing,*** August 1979. (ERIC Document Reproduction Service No. ED 174 968, 48p., PC-$3.32, MF-$.83)

No. 135 Schwartz, R. M. ***Levels of Processing: The Strategic Demands of Reading Comprehension,*** August 1979.

No. 136 Anderson, R. C., & Freebody, P. ***Vocabulary Knowledge,*** August 1979.

No. 137 Royer, J. M., Hastings, C. N., & Hook, C. ***A Sentence Verification Technique for Measuring Reading Comprehension,*** August 1979.

No. 138 Spiro, R. J. ***Prior Knowledge and Story Processing: Integration, Selection, and Variation,*** August 1979.

No. 139 Asher, S. R., & Wigfield, A. ***Influence of Comparison Training on Children's Referential Communication,*** August 1979.

No. 140 Alessi, S. M., Anderson, T. H., & Goetz, E. T. ***An Investigation of Lookbacks During Studying,*** September 1979.

No. 141 Cohen, P. R., & Perrault, C. R. ***Elements of a Plan-Based Theory of Speech Acts,*** September 1979.

No. 142 Grueneich, R., & Trabasso, T. ***The Story as Social Environment: Children's Comprehension and Evaluation of Intentions and Consequences,*** September 1979.

No. 143 Hermon, G. ***On the Discourse Structure of Direct Quotation,*** September 1979.

No. 144 Goetz, E. T., Anderson, R. C., & Schallert, D. L. ***The Representation of Sentences in Memory,*** September 1979.

No. 145 Baker, L. ***Comprehension Monitoring: Identifying and Coping with Text Confusions,*** September 1979.

No. 146 Hall, W. S., & Nagy, W. E. ***Theoretical Issues in the Investigation of Words of Internal Report,*** October 1979.

No. 147 Stein, N. L., & Goldman, S. ***Children's Knowledge about Social Situations: From Causes to Consequences,*** October 1979.

No. 148 Hall, W. S., & Guthrie, L. F. ***Cultural and Situational Variation in Language Function and Use: Methods and Procedures for Research,*** October 1979.

No. 149 Pichert, J. W. ***Sensitivity to What is Important in Prose,*** November 1979.

No. 150 Dunn, B. R., Mathews, S. R., II, & Bieger, G. ***Individual Differences in the Recall of Lower-Level Textual Information,*** December 1979.